Annual Report of the Instrumentation Physics Laboratory 2013

Summary

In 2013 the Instrumentation Physics Laboratory had 6 full-time Ph.D. faculty supervising 50 student members (8 Ph.D., 13 M.S., 29 BS) under 4 research subgroups. Five projects were on-going, one terminated in November 2013. This year, the works of IPL researchers received the most press attention, 14 news citations in international and national media. Eight ISI papers were published or accepted for publication in 2013.

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Structure

Research at the Instrumentation Physics Laboratory is led by Principal Investigators with the following interests:

Dr. Maricor Soriano heads the **Video and Image Processing (VIP)** group which develops instrumentation and algorithms to analyse signals, images and video from multidisciplinary domains such as marine science, arts and heritage, medicine, and sports. VIP is located at R203 and 204.

The group headed by **Dr. May Lim** (**Complex System Team/ http://cxteam.liknayan.com**) investigates sociotechnical systems that are rich in empirical data. The group is actively involved in data mining social media, agent-based modeling of ecological systems, agent-based modeling of vehicular traffic, and analyzing complex networks.

The group headed by **Dr. JohnrobBantang (Complexity Science Group / CSI)** investigates biological systems and granular materials from a complex system perspective. The group also looks into the use of network models in analyzing complex system dynamics such as epidemic spreading and other dynamics related to social structure.The location of both CXTeam and CSI is at R401.

Dr. Giovanni Tapang heads the **Synchronization and BioOptics** group. Synchronization looks into patterns and synchronization in historical records, literature and real signals. Together with **Dr. Caesar Saloma** the Optics and Photonics research of group is in Brownian motion, microscopy and microfabrication. Dr. Tapang also heads the Versatile Instrument System for Science Education and Research (VISSER) project which has its office at F105.

Composition

SENIOR STAFF

In 2013 the Instrumentation Physics Lab had six (6) Ph.D. faculty among its senior staff. These are:

1. Dr. Caesar Saloma (Chancellor, UPD)
2. Dr. Maricor Soriano (Coordinator, IPL)
3. Dr. May Lim (Deputy Director for Academic Affairs, NIP)
4. Dr. Giovanni Tapang (Associate Dean for Student and Public Affairs, College of Science)

5. Dr. JohnrobBantang (Director UP Computer Center, UPD)
6. Dr. Christian Alis (scheduled for postdoc leave January 2014, University College London, UK)

POSTDOCS

Dr. Rene Batac who is on official leave from NIP is on his second year as post-doctoral fellow at the Max Planck Institute for the Physics of Complex System in Dresden, Germany. In May 2013 Dr. Jesus Felix Valenzuela left NIP to join A*STAR Institute of High Performance Computing in Singapore as scientist. This year the student members of the Instrumentation Physics Lab total fifty (50), twenty-one (21) of which are graduate students and twenty-nine (29) are undergraduates.

PHD (8)

1. Stephen Daedalus E. Separa, MS
2. Maria Teresa Pulido , MS
3. Josephine Jill T. Cabatbat, MS
4. Paul Leonard Atchong C. Hilario, MS
5. Reniel B. Cabral, MS
6. AntoninoPaguirigan, Jr.
7. Gerold C. Pedemonte, MS
8. Rosemarie Terio

MS (13)

1. Mary AngelieAlagao
2. Benjur Emmanuel Borja
3. Michael Castañares
4. Mar Philip Elaurza
5. Jen-Jen Manuel
6. John Paolo Maulion
7. James Christopher Pang
8. Louela Alva Presbitero
9. Aimee Rarugal
10. Kristine Faith Roque
11. Maria Isabel Saludares
12. Gabriel Dominik Sison
13. Ma. Eloisa Ventura

5TH YEAR (13)

1. Meryl ReginеAlgodon
2. Adrian Chester Balingit
3. Katherine Anne Bulan
4. AerielConstantino
5. Phoebe Gallanosa
6. Wynn Dunn Gil Improso
7. Abigail Mae Jayin
8. Chris Eric Limos
9. Norman Mascariñas
10. Lugienor Lucille Roberto
11. Alix Jean Santos
12. Anjali Tarun

13. Krister Jazz Urog
14. GilianUy

4th YEAR (8)

1. Alfred Abella
2. Ritz Ann Aguilar
3. Pio Gabrielle Calderon
4. Damian Dailisan
5. Shar Mae Gayangos
6. Ma. Christina Jamerlan
7. Julia Rio Therese Negre
8. Pamela Anne Pasion

3rd YEAR (8)

1. Cephas Olivier Cabatit
2. Ariel Carlos Cañete
3. Prince Garnett Goting
4. Jessica Nasayao
5. Jaime Lorenzo Olivares
6. Roland Albert Romero
7. Aldrich Suratos
8. Albert Yumol

COLLABORATORS

Former IPL members such as Dr. Christopher Monterola, Dr. Erika Legara, Dr. Ranzivelle Marianne Roxas-Villanueva, continue to collaborate on complex system and granular materials topics. Other collaborators come from the Marine Science Institute (such as Dr. PorfiroAliño, Dr. Helen Yap, Dr. Cesar Villanoy, Dr. Laura David and Dr. Wilfredo Licuanan), the Department of Filipino and Philippine Literature (Dr. Ramon Guillermo), the Department of Computer Science (Dr. Prospero Naval), Institute of Chemistry (Dr. Imee Su-Martinez), Institute of Biology (Dr. AnacletoArgayosa), Department of Electrical and Electronics Engineering (Ms. Romarie Lorenzo), Institute of Environmental Science and Meteorology (Dr. Gay Jane Perez), UPLB Institute of Mathematics and Physical Sciences (Prof. NelioAltoveros).

Projects Initiated or On-going

1. VISSER::SM- VISSER – Sensors and Modules

Dr. Giovanni TapangProject Leader
UP Emerging Interdisciplinary Research Cycle 2 2013-2015
P 13.28 M
7 collaborators (RD Gomez, RML Roxas-Villanueva, G Perez, I Su-Martinez, A Argayosa, R Lorenzo, N Altoveros)

The proposed project VISSER::SM (Versatile Instrument System for Science Education and Research – Sensors and Modules) addresses the lack of laboratory equipment and teaching modules in the Philippines and seeks to introduce low-cost and versatile research-grade laboratory equipment in our classrooms. VISSER::SM is a collaborative program with a very simple mission: “Put modern science labs at every school & college”. The project involves researchers from UP Diliman, UP Los Banos and Balik Scientist Prof. Romel Gomez of the University of Maryland. The goal is to design and develop at least 40

home-grown experimental modules based on a handheld microcontroller-based universal platform that can replace existing experiments as well as be the basis for new sophisticated laboratory setups.

Project has finished prototype design and is preparing for pilot testing.

2. VISSER DOST Y2
VISSER - Versatile Instrumentation System for Science Education and Research
Dr. Giovanni Tapang, Project Leader
Department of Science and Technology GIA
2012-2014
P 11.5 M
7 collaborators (RD Gomez, RML Roxas-Villanueva, G Perez, I Su-Martinez, A Argayosa, R Lorenzo, N Altoveros)

The VISSER project aims to have a system centered around a handled microcontroller-based universal platform. Using this as the "brain",, many different sensors can be connected to it and controlled to perform experiments in various science field. The transition from one experiment to another will be effortless that its is envisioned that the units can be used in several experiments on various topics in a single day. It will fully integrate the hardware and software and will supplement by well-written,, highly descriptive manuals that will facilitate individual learning. The hardware consists of a multichannel data acquisition,, plug and play analog and digital sensors that run on an Arduino microcontroller. The software includes data storage,, control,, user interface,, as well as analysis tools that will be developed using open source environments. The documentation will be highly descriptive manuals for the laboratory modules.

The overarching objective of this project is to develop instrumentation systems to enhance scientific pedagogy and research that can be deployed in all secondary and tertiary schools in the Philippines. The specific research objectives are as follows: 1. Develop the hardware component which consists of a hand-held multichannel data acquisition system and plug and play analog and digital sensors. 2. Develop the software which includes data storage,, control,, user interface,, as well as analytical tools. 3. Develop high-quality laboratory manuals and instructional materials that integrate theory and real-world measurements. 4. Develop specific sets of laboratory experiments in biology,, chemistry,, physics,, environmental science and engineering. 5. Develop enabling technologies with applications to natural disaster warning and mitigation. 6. Develop and produce highly-trained professionals in the area of science education,, instrumentation design and information systems.

Project has finished prototype design and is preparing for pilot testing.

3. Effect of broadband and monochromatic light sources on the growth of Saccharomyces cerevisiae yeast cells
Dec 2013-Dec 2014
Dr. Giovanni Tapang, Project Leader
OVCRD
300,000
We study the effects of broadband and monochromatic light sources on the growth of Saccharomyces cerevisiae or yeast cells using an inverted microscope with different modes of illumination. We shall illuminate the sample with a 10 W white LED passed through a monochromator, a white LED without the monochromator, as well as different laser sources, with different optical powers, in pulsed and in

continuous modes, for a period covering the average life cycle of a yeast cell. We shall study at what power will the yeast cell growth will be inhibited, or stimulated, as the case may be.

4. SOCIAL-ECOLOGICAL RESILIENCE ON DIFFERENT SPATIAL AND TEMPORAL SCALES (EMPHASIS ON THE COAST)
Emerging Interdisciplinary Research Grant ,
Dr. JohnrobBantang (no information)

5. AUTOMATED RAPID REEF ASSESSMENT SYSTEM (ARRAS) YEAR 3
DOST-GIA ,(Total Budget:PhP18,520,969, Budget for Year 3: PhP6,274,094)
June 2010-November 2013
Dr. Maricor Soriano, Project Leader
Collaborators : Dr. Wilfredo Licuanan (DLSU), Engr. Roel John Judilla (MAPUA), Dr. Prospero Naval (Dept. Computer Science, UPD), Dr. Cesar Villanoy (UP MSI), Dr. Laura David (UP MSI).

The Automated Rapid Reef Assessment Program aims to create tools for quick and cost efficient coral reef assessment and visualization. Tools and protocol developed in the project have been deployed in more than 13 sites around the Philippines and were used to measure the grounding damage in Tubbataha Reefs Natural Park, a UNESCO World Heritage Site.

Publications

ISI Journals

2014 (3)

- Cabral,R., Aliño, P., and Lim, M. (2014). Modelling the impacts of fish aggregating devices (FADs) and fish enhancing devices (FEDs) and their implications for managing small-scale fishery. ICES Journal of Marine Science DOI:10.1093/icesjms/fst229
- Pang J., Monterola C., andBantang, J. (2014), Noise induced synchronization in a lattice Hodgkin-Huxley neural network, PhysicaA 393 (2014) pp 638-645.
- Muallil, R. N., Mamauag, S. S., Cabral, R. B., Celeste-Dizon, E. O., &Aliño, P. M. (2014). Status, trends and challenges in the sustainability of small-scale fisheries in the philippines: Insights from FISHDA (fishing industries' support in handling decisions application) model. Marine Policy, 44, 212-221.

2013 (5)

- Alis C., & Lim M. (2013). Spatio-temporal variation of conversational utterances on twitter. PloS one, 8 (10) PMID: 24204968, DOI: 10.1371/journal.pone.0077793.
- Cabatbat, J. J. T., Monsanto, J. P., &Tapang, G. A. (2013). Preserved network metrics across translated texts. International Journal of Modern Physics C, (2), 1-9.
- Cabatbat, J. J. T., &Tapang, G. A. (2013). Texting styles and information change of SMS text messages in Filipino. International Journal of Modern Physics C, 24(2).
- Cabral, R., Cruz-Trinidad, A., Geronimo, R., Napitupulu, L., Lokani, P., Boso, D.,.Aliño, P. (2013). Crisis sentinel indicators: Averting a potential meltdown in the coral triangle. Marine Policy, 39(1), 241-247.
- Cabral, R. B.,Aliño, P. M., &Lim, M. T. (2013). A coupled stock-recruitment-age-structured model of the north sea cod under the influence of depensation. Ecological Modelling, 253, 1-8, DOI: 10.1016/j.ecolmodel.2012.12.031.

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International Conference Proceedings (1)

- Litimco, C. E. O., Villanueva, M. G. A., Yecla, N. G., Soriano, M. N.,& Naval, P. C. (2013). Coral identification information system. Paper presented at the 2013 IEEE International Underwater Technology Symposium, UT 2013,

National Conference Proceedings (36)

- R. Alfonso, R. Pingol, MC Carasco, A. Mella, RML Roxas-Villanueva, G. Tapang and R. Gomez, Developing HOTS with VISSER: Bridging the need for science instrumentation in Philippine schools, 2013 International Research Conference on Innovations in Engineering, Science and Technology, Batangas State University, Batangas City, Philippines, November 27-29, 2013

PROCEEDINGS OF THE SAMAHANG PISIKA NG PILIPINAS PHYSICS CONGRESS, UNIV. OF SAN CARLOS, CEBU CITY 22-25 OCT 2013

- Alis, C. and Lim, M. Short-scale shortening of Twitter utterances
- Cabral, R, Aliño, P and Lim, M: Impact of Fishing and Increasing Temperature on the North Sea Cod SPP-2013-118.
- Hilario PLA, and Tapang G: Indepedently controlled light fields generated using a piecewise defined aperture
- Pedemonte, G. Bantang, J. Lim M. : The road less travelled: efficient one-way traffic scheme in complex networks.
- Terio, R and Soriano, M. : Battacharyya distance of shape feature histogram as aid to authenticate H.R. Ocampo Paintings SPP-2013-197
- Borja, BE and Bantang, J Flux calculations of percolating particles in 2D space SPP-2013-194
- R. Alfonso, R. Pingol, MC Carasco, A. Mella, H. Ramirez, N. Altoveros, RML Roxas-Villanueva, G. Tapang and R. Gomez, Enhancing HOTS in Science Pedagogy with VISSER, Proceedings of the 31st SPP Conference 2013, University of San Carlos Cebu
- Castañares, ML, Roque, KF, Hilario, PLA and Tapang, Effect of broadband and monochromatic light sources on the growth of Saccharomyces cerevisiae yeast cells.
- Elaurza, M., Tapang, G., Saloma, C., Estimation of Trajectory from Autofocused Trajectory using Interpolation method
- Pang, J. Multilevel Marketing Enterprise as a Branching Dendrite
- Presbitero, A and Bantang, J Mapping Node Criticalities in a Curriculum Network SPP-2013-136
- Rarugal, A, Roxas-Villanueva, RM and Tapang, G Determination of influential factors on climate variability and health in Cavite, Philippines: a time series analysis SPP-2013-054
- Roque, K.,Hilario, P., Tapang, G.,Saloma, C., Radiation forces exerted by a Gaussian beam on an ellipsoidal dielectric particle
- Rarugal, A.andTapang, G., Spectral analysis of oil price distribution in the Philippines,
- Sison, G., Tapang, G. Analysis and Modeling of Edge Weight Distributions in Dense Small Node Co-authorship Networks, SPP-2013-031
- Ventura,M.E., Hilario, P., Tapang, G., and Saloma, C., Optimization of a phase-only spatial light modulator for the improvement of Bessel beam generation
- Algodon, MR and Soriano, M Camera Array Modeling for Large Scale Coral Reef Surveillance through Area Calibration of Underwater Camera SPP-2013-098
- Balingit, AC, Cabral, R and Lim, MInfluence of seeding patterns on a single-species forest population SPP-2013-132
- Bulan, KA and Bantang, J. Effect of clustering to the dynamics of epidemic spread in a square lattice SPP-2013-016

- Calderon, PG and Bantang, J Retention of cultural identity in a swarm of diverse agents SPP-2013-058
- Dailisan, D and Lim, M Dissolving traffic jams via adaptive lane changing SPP-2013-114
- Gallanosa, P. and Soriano, M.Transformable bounding box for the automated tracking of fencer limb movements SPP-2013-142
- Tapang, G, Cabatbat, JJ and Gayangos, SM, Rubik's Cube Transformation Networks SPP-2013-184
- Jamerlan, MA, Cabatbat, JJ, Roxas-Villanueva, RM and Tapang, G Bird call characterization using music networks: SPP-2013-151
- Jayin, AM, Bantang, J and Batac, R Dual scaling properties of size and rank-frequency distributions in a model of alternating popularity growth and decay SPP-2013-047
- Limos, C and Soriano, M Block segregation of coral mosaics via gray level co-occurrence matrix SPP-2013-141
- Mascariñas, N, Hilario, PLA, Tapang, G and Saloma, C Experimental observation of the effect of imaging resolution on the apparent diffusion coefficient and mean free path of a Brownian particle: SPP-2013-182
- Pasion, PA, Cabatbat, JJ and Tapang, G Comprehensibility of Text and Subgraph Deletion in Synset Networks SPP-2013-163
- Santos, AJ and Soriano, M An improved feature matching algorithm for reef surface reconstruction SPP-2013-020
- Tarun, A and Batac, R, Bantang, J Analysis of avalanche dynamics using color-coded layers of grains SPP-2013-084
- Urog, KJ, Yap, H and Bantang, J Effects of spatial distribution and behavior in a logistic equation-based model of natural resources: SPP-2013-093
- Uy, G and Lim, M , A Probabilistic Model Mimicking Conway's Game of Life, SPP-2013-203
- Philippine Association of Marine Science Symposium
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Awards

1. Dr. Maricor Soriano – The Outstanding Women in the Nation's Service (TOWNS) 2013.

News Clippings

PRESS/BLOG COVERAGE OF THE PUBLICATION: C.M. ALIS AND M. T. LIM. SPATIO-TEMPORAL VARIATION OF CONVERSATIONAL UTTERANCES ON TWITTER. PLOS ONE 8(10): E77793 (2013)

- [MIT Technology Review online] Tweets Have Become Shorter Since 2009, Say Computer Scientists http://m.technologyreview.com/view/520311/tweets-have-become-shorter-since-2009-say-computer-scientists/*"Christian Alis and May Lim at the University of the Philippines say they have measured how the length of tweets have changed between September 2009 and December 2012 and say that tweets have shrunk dramatically in that time."*
- [TIME.com] The Incredible Shrinking Tweethttp://techland.time.com/2013/10/16/the-incredible-shrinking-tweet/*"Study authors Christian Alis and May Lim attribute the*

shortening of tweets to the increased use of jargon, implying Twitter users are self-segregating into subgroups that understand the same lingo ...."

- [GMANews online] Tweets are shrinking, UP physicists say
- [Neuroskeptic blog @ DISCOVER Magazine] Why Are (Some) Tweets Getting Shorter?
- [National Post] Who needs 140 characters anymore? Tweets keep getting shorter, new study finds

- [The Switch @ Washington Post] http://www.washingtonpost.com/blogs/the-switch/wp/2013/10/15/this-chart-shows-our-tweets-are-getting-shorter/: *"Good tweeting is often an exercise in good editing — cramming any thought into 140 characters can be a challenge in itself, let alone coming up with something smart or witty. But it turns out that a lot of us have actually become pretty effective at not hitting the character limit."*

TUBBATAHA GROUNDING DAMAGE ASSESSMENT

- 2013 Rappler: http://www.rappler.com/science-nature/28036-pinoy-gadget-tubbataha-assessments*"An automated rapid reef assessment system invented by the team of Dr. Maricor Soriano of the University of Philippines (UP) was one of the technologies used to make permanent visual records for the damage done at the Tubbataha reef."*

- 2013 GMANews : http://www.gmanetwork.com/news/video/158284/24oras/pinsala-ng-sumadsad-na-chinese-fishing-vessel-sa-tubbataha-reef-kasinglawak-na-raw-ng-5-basketball-courts

- 2013 ANC :http://www.youtube.com/watch?v=ucMVM3LRqRM*"A new team of experts is headed to Tubbataha to take new images of the reef following the removal of the Chinese fishing vessel." Dr. Soriano appeared as guest in the news.*

PDAF RELEASES VISUALIZED AS NETWORKS BETWEEN LAWMAKERS AND NGO'S

- 2013 UP Forum: Visualizing the Ties that Bind in the PDAF http://www.up.edu.ph/visualizing-the-ties-that-bind-in-the-pdaf/

- 2013 Inquirer Print/inquirer.net UP physics prof does the math on pork plus NGOs, http://technology.inquirer.net/29119/what-science-teaches-us-about-the-pork-network

- 2013 GMANews UP physicists map pork releases from lawmakers to NGOs http://www.gmanetwork.com/news/story/325579/scitech/science/up-physicists-map-pork-releases-from-lawmakers-to-ngos

- 2013 ABS-CBN How pork barrel connects lawmakers, NGOs http://www.abs-cbnnews.com/focus/09/09/13/how-pork-barrel-connects-lawmakers-ngos

- 2013 Rappler Pork barrel scam: Visualizing the ties that bind http://www.rappler.com/nation/38526-visualizing-pork-barrel-scandal-ties

Extension and Linkages

1. In Febuary 2013 the Video and Image Processing Group co-organized START 2013 Science and Technology for Art at the National Museum.

2. In April 2013 and October 2013 the ARRAS Team under Dr. Soriano measured and recorded the grounding damage at the Tubbataha Reefs caused by USS Guardian and M/V Min Long Yu.